

PROCEDURES FOR PERFORMING REMOVABLE CONTAMINATION SURVEY

Removable contamination surveys must be routinely conducted to control radioactive contamination on surfaces of laboratory benches, equipment, floors, walls, etc., and to insure contamination has not spread to unrestricted areas.

Step 1: DOCUMENT THE SURVEY -

- ▶ Use any format you prefer, just include all survey information. The BA Radiation Safety "Laboratory Radiation Survey" is the example shown; these forms are available for your use.
- ▶ Record: 1) survey date; 2) authorized user; 3) areas surveyed; 4) person performing the survey; 5) sketch of area identifying samples taken; 6) survey results; and 7) any action taken.

Step 2: DIAGRAM AREA & EQUIPMENT TO BE SURVEYED -

- ▶ Prepare a sketch of the laboratory, indicating all areas and equipment to be surveyed.

Step 3: TAKE WIPE SAMPLES -

- ▶ Take a "wipe" sample, using a dry paper wipe while applying moderate pressure. Each wipe should sample approx. 100cm². "Removable" contamination is surface contamination that is transferred to the wipe.
- ▶ Key wipes to diagram locations.
- ▶ A sufficient number of samples must be taken to insure contamination has not spread from radioisotope use areas to unrestricted areas of the building. Typically, ten to twenty wipe samples are taken.
- ▶ Wipes should include floors (especially around waste containers), sinks, benchtops, refrigerators, doors, centrifuges, etc. A wipe of the floor area entering the lab or "restricted area" should also be included.
- ▶ Generally, wipes are not taken from absorbent bench coverings in radioisotope work areas as these areas should be labeled "Caution Radioactive Materials" and treated as being contaminated. Instead, take thorough wipes of surfaces and floors adjacent to these use areas.
- ▶ Some contamination is permitted* on work surfaces and equipment as long as the item is dedicated for radioisotope work, is properly labeled, and the spread of contamination is prevented through surveys and the use of protective clothing.

Step 4: ANALYZE THE WIPES -

- ▶ Include a control/background sample which contains an unused wipe.
- ▶ Analyze wipes in an instrument with sufficient sensitivity to detect the radiation from the wipes.
- ▶ Typically wipes for beta emitters will be placed in a vial with scintillation cocktail and counted in a liquid scintillation counter.
- ▶ Wipes for gamma emitters are counted dry in a gamma counter, however, low energy gamma emitters such as ¹²⁵I can also be counted with cocktail in a liquid scintillation counter.
- ▶ Report any contamination* and the results of decontamination efforts.

*See Table 1 for removable contamination limits.

BELTSVILLE AREA • RADIATION SAFETY
LABORATORY RADIATION SURVEY
For survey requirements and procedures for performing radiation surveys, see the Beltsville Area - Radiation Safety "Laboratory Radiation Survey Checklist"

Survey Date: 1/4/95	Authorized User: JOHN SMITH	Area Surveyed (Bldg. & Rm.): B-008 Rm. 21	Surveyor: BARB FLOOD
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AREA SKETCH:

WIPE TEST RESULTS (in DPM):

Nuclide(s)	Counting Equipment Used	Efficiency (%)	Blkd. (cpm)	Wipe Location	1	2	3	4	5	6	7	8	9	10	11	12	13	14
³ H	LKB RACKBETA	30		ALL	<100 DPM													
¹⁴ C	"	EFF. 89%	45	ALL	<100 DPM													
¹²⁵ I	LKB GAMMA EFF M6L	320			<1100 DPM								230	<1100 DPM				

RADIATION LEVEL / METER SURVEY RESULTS:

Survey Meter Used (manufacturer, model, & detector): (EMP M4-S) Meter SN: 116467 Calibration Date: 10/26/94 Background: 200 cpm

Meter Readings (check one):
☐ Background ☒ Exposed Background at Location(s) # 5 Reading(s): 900 cpm

Action taken: NO ACTION - ¹²⁵I WASTE STORAGE AREA

REMARKS: - AREA #9 CLEANED + REWIPE - NOW <100 DPM.
- COUNTER PRINTOUTS ATTACHED.

Step 5: INTERPRET & REPORT RESULTS -

- ▶ Results MUST be reported in DPM (disintegrations per minute.)

$$DPM = \frac{\text{Counts per minute} - \text{Background}}{\text{Instrument Efficiency}}$$

- ▶ The instrument counting efficiency for a particular radionuclide is determined by counting a standard of known activity.
- ▶ When counting multiple radioisotopes without separate counting channels, calculate DPM using the lowest efficiency value.
- ▶ Results may be reported as "< 100 DPM" if a copy of the counting instrument printout is included with the survey, and efficiency and background values are provided.

Table 1. Removable Contamination limits

Area or Item	Removable Contamination (DPM/100cm ²)
Labeled equipment, work areas, etc. in radioisotope laboratories	1,000
Unrestricted areas, lab equipment, notebooks, etc. taken outside radioisotope laboratories	100

For additional information contact the Beltsville Area Radiation Safety Unit on 504-5557

(5/96)

Contamination Limits - Radioisotope Use Labs and Unrestricted Areas:..

Some contamination is allowable within a restricted area and on work surfaces and equipment as long as the area is dedicated for the use of radioactive materials, is properly labeled, and the spread of contamination is prevented through laboratory surveys and the use of protective clothing. The allowable contamination limits are specified in Table 8.

Table 8

Type of Area	Low-Risk Beta or Gamma-ray Emitters DPM / 100 cm ²		Beta or Gamma-ray Emitters DPM / 100 cm ²		Alpha Emitters DPM / 100 cm ²	
	Fixed	Removable	Fixed	Removable	Fixed	Removable
Radioisotope Use Laboratories, Restricted Areas, and protective Clothing Worn only in a Restricted Area	110,000	22,000	11,000	2,200	1,100	220
Unrestricted Areas, and Personal Clothing Worn Outside a Restricted Area	11,000	2,200	1,100	220	110	22

Note: **Low** risk nuclides include H-3, C-14, S-35, and others whose beta energies are less than 0.2 MeV maximum, or whose gamma-ray emission is less than 0.1 R/hr at 1 meter per Curie of activity.

Contamination Limits for Release of Facilities or Equipment:

Before releasing a radioisotope laboratory or other work area for unrestricted use, all radioactive materials shall be removed. The laboratory or work area shall then be surveyed and, if necessary, decontaminated. Laboratories or areas having removable contamination levels in excess of those indicated in the Table 7 will not be released for unrestricted use.

Table 7:

Type of Radioactive Material	Average Fixed Contamination DPM / 100 cm ²	Maximum Fixed Contamination DPM / 100 cm ²	Maximum Removable Contamination DPM / 100 cm ²
Beta or Gamma-ray Emitters not Listed Below	5,000	15,000	1,000
I-125, I-129, k-227, Pa-231, Ra-226, Ra-228, Th-228, Th-230, Transuranics	100	300	20
Natural Uranium, U-235, U-238, and associated decay products	5,000	15,000	1,000
Natural Thorium, Th-232, Sr-90, Ra-223, Ra-224, U-232, I-126, I-131, I-133	5,000	15,000	1,000

Note: For the purposes of laboratory surveys, the average fixed contamination can be calculated by taking the average of the measurements.

Survey results must be submitted in units of activity or DPM. The survey should include measurements of fixed and removable contamination in drain traps, floor drains, and duct work that may have been contaminated through use of radioactive materials. The results of radioactive contamination surveys shall be submitted to the RSS for review. The laboratory shall not be released for unrestricted use until the user has received approval in writing from RSS.